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## Interactive effects of work psychosocial factors on participation in workplace wellness programs

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### Abstract

This study explored concurrent effects of six work psychosocial factors on current participation and the self-reported likelihood of future participation in workplace wellness programs using a cross-sectional survey, an ad hoc focus group, and structured interviews. Classification and regression tree analysis was used to analyze survey responses from 343 employees (194 nonparticipants, 95 participants, and 54 engaged participants). A thematic analysis of focus group ( $n = 7$ ) and interview ( $n = 5$ ) narratives was also undertaken. In combination with high work control, high superior support was associated with an engaged participant profile. Job demand was the third important variable with low and very high levels associated with participation. With regard to high likelihood of future participation, among respondents with age older than 50, high predictability of occupational activities and control were identified as a significant factor, and among others, high superior support and control. The analysis of narratives revealed peer relations and flexible working hours to be positively linked to participation and general job stress was identified as having a bidirectional relationship. Employees stated that stress led them to take advantage of these programs as a source of relief and that their availability/participation has contributed to lowering their stress. These findings inform practitioners about the importance of addressing poor psychosocial factors as a participation barrier and having a holistic approach to employee well-being.

### Keywords

Health promotion; occupational health; total worker health; work psychosocial factor; workplace wellness

### Introduction

The high prevalence of chronic health conditions such as obesity (36%) (Ogden, Carroll, Fryar, & Flegal, 2015), back pain (26%) (Deyo, Mirza, & Martin, 2006), chronic stress and mental disorders (13%) (Hasin, Goodwin, Stinson, & Grant, 2005), and diabetes (12%–

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14%) (Menke, Casagrande, Geiss, & Cowie, 2015) is in part due to behavioral risk factors such as poor diet and low physical activity. More than one half the population are either inactive or insufficiently active (Hootman, Macera, Ham, Helmick, & Sniezek, 2003), and the majority of Americans fail to meet the dietary guidelines for consumption of the main four food groups (i.e., fruit, vegetables, whole grains, and reduced fat dairy products) (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). These health conditions impair work performance and other productivity measures (Sangachin & Cavuoto, 2016; Stewart, Ricci, Chee, Morganstein, & Lipton, 2003) and burden employers with resulting high health care costs (Anderson & Horvath, 2004). Poor working conditions contribute to these negative health behaviors that ultimately lead to the chronic conditions, forming a vicious cycle. For instance, a stressful work environment, in which employees perceive an imbalance between their effort level and the resulting rewards, has been found to be a risk factor for alcohol dependency (Head, Stansfeld, & Siegrist, 2004). When decision latitude and job psychological demands are arrayed to form a four-quadrant diagram, they define the strain and active behavior hypotheses of the Karasek's demand/control model (Karasek et al., 1998). As such, high job strain and low control at work have been observed to be associated with subsequent weight gain among overweight and obese employees (Kivimäki et al., 2006). Substance dependency and obesity are reported to impair work performance (Mangione et al., 1999; Sangachin & Cavuoto, 2016). On the other hand, there can be favorable outcomes from a positive work environment. Results from a cross-sectional study among 2000 middle-age U.S. employees identified high work control and its interaction with job demands as possible facilitators of active leisure time physical activity (Choi et al., 2010). Physical activity enhances cardiorespiratory fitness, which is then associated with higher work performance, in terms of how much gets done while at work and how much extra time or effort is required to perform the work (Pronk et al., 2004).

This evidence suggests that may be a bidirectional relationship between work characteristics and outcomes, and employees' health-related behaviors and status. Based on this rationale and with the aim of improving employees' well-being while reducing health care costs, employers have been tasked with providing worksite wellness programs (WWPs). Well-structured wellness programs have been shown to enhance employees' health status and reduce health care costs, while remaining financially justifiable (Goetzel, Guindon, Turshen, & Ozminkowski, 2001) and enhancing individual and business performance metrics (Goetzel et al., 2014). However, according to the RAND employer survey, fewer than one half of employees undergo clinical screening, which is the key component in recognizing the appropriate intervention for employees. Of those identified in need of health intervention, less than one fifth choose to participate in the offered WWPs (Mattke et al., 2013). The reported low participation rates (highly variable, but typically below 30%) and a failure to deliver the intervention to those with the highest health risks (Thompson, Smith, & Bybee, 2005) may limit the effectiveness of this approach to health promotion and weaken the business case presented to organizational managers in support of offering such programs. Therefore, it is critical to identify personal and organizational factors that affect participation rate.

In a systematic review of the determinants of participation in worksite health interventions, a set of demographic and other descriptive characteristics of participants versus

nonparticipants has been identified. As such, female, married or cohabiting, and White employees have been shown to be more willing to engage in such programs (Robroek, Van Lenthe, Van Empelen, & Burdorf, 2009). Regarding the job, white-collar employees with secure contracts and full-time employees are reported to have higher participation compared to employees on shift work (Morris, Conrad, Marcantonio, Marks, & Ribisl, 1999). As for the employer, company size influences participation level, with smaller companies having higher participation rates (Dean, Read, & Gzowski, 1983). Glasgow, Vogt, and Boles (1999) suggested inclusion of participants and nonparticipants' psychosocial factors as a potential determinant of program reach, the percentage of individuals who receive or are affected by the program. The effects of major components of a work system (employer, the employee, the job, and the environment) on the design and participation level of WWPs have been summarized in a conceptual model developed based on the review of literature (see Figure 1).

Personal psychosocial factors such as self-efficacy and anxiety are significant determining factors of participation (Davis, Jackson, Kronenfeld, & Blair, 1984); however, work psychosocial factors have largely been neglected in the analysis of WWPs (Glasgow et al., 1999). Work psychosocial factors reflect the interactions between the employee and his or her perception of the job, the employer, and the surrounding work environment and are considered a major occupational safety and health concern (Kompier, 2002). Jørgensen, Villadsen, Burr, Punnett, and Holtermann, (2016) showed that among a cohort of 10,605 Danish employees from diverse industries, lower participation in WWPs was associated with low social support, very fatiguing work, and high physical or emotional demands with low work control. Although this study suggests an association between demand, control, or social support with the decision to participate in a WWP, availability of the program and the participation status were self-reported and considered as binary variables. It is possible that selection bias affected the results, such that those aware of such programs were a selected group. Also, a binary variable for participation within the last year does not fully reflect all possible levels of participation and does not distinguish those who participated only once from those participating on a regular basis. There is evidence suggesting that determinants of participation may differ from those of active participation or engagement (Beck, Hirth, Jenkins, Sleeman, & Zhang, 2016).

We aimed to examine primarily the association between work psychosocial factors and the levels of current and future participation in WWPs. As opposed to considering an individual factor's effect on participation, we explored concurrent and interactive effects of job demand, work control, and social support at work on current participation status and the self-reported likelihood of future participation. As the secondary aim, we qualitatively investigated the direction of the potential associations based on employee feedback.

## Method

There were two phases to the current study. First, the existence of an association between work psychosocial factors and different participation levels in WWPs was investigated using a cross-sectional survey. Then, the direction of the observed associations was qualitatively explored from the feedback of selected employees during an ad hoc focus group and structured interviews.

## Setting

A public university in western New York, with more than 6,000 full-time employees was selected as the setting. Additional details of the setting are described elsewhere (Sangachin & Cavuoto, 2015). Table 1 summarizes the employee demographics. At the time, diverse multipurpose wellness program components and facilities were available to employees. This study focused on the fitness-related and healthy eating programs. Example of these components included discounted rates and free hours of multiple fitness programs such as Zumba, Pilates, yoga, and strength training offered weekly at two sites on campus; recreational indoor and outdoor facilities such as a jogging track, swimming pool, racquetball courts, soccer and rugby fields; and healthy eating campaigns to lose (and maintain) weight. In addition, smoking cessation assistance and paid leave for free cancer screening were available but not examined in this study.

## Phase 1. Survey and measures

The General Nordic Questionnaire for psychological and social factors at work (QPS NORDIC), a psychometrically tested and validated instrument (Dallner, 2000) was the core of the self-administered anonymous survey. This widely used survey, developed by a group of scientists from Nordic countries in late 1990s, has been claimed to be most useful in participatory improvement of the psychosocial factors at work and can be applied for research purposes with the goal of investigating associations between work, health and productivity. The 120 questions, categorized in 15 subscales, ask about 14 different measures of work psychosocial factors. The psychosocial factors measured in this work were job demands (quantitative, decision, and learning demands), control at work (pacing and decisions), social interactions (support from coworkers and superior), leadership (empowering and fair leadership), role expectations (role clarity and conflict), and predictability at work (predictability of next month and of next 2 years). Demographics including gender, age, ethnicity, and education level, as well as current participation status (nonparticipant, participant) and the likelihood of future participation (not likely at all to highly probable) were asked from all respondents. Frequency of participation during the previous year and program type were only asked from respondents who indicated participation. Additionally, respondents were asked to report their current weight, height, and health status (as indicated by checking boxes for common adverse health outcomes). The survey invitation link was embedded in the campus online weekly newsletter twice, 2 weeks apart. Although the vast majority of university employees hold white-collar positions and were expected to have Internet access for the online survey, paper versions were mailed to facilities and custodial services employees' campus mailboxes. Survey respondents were asked if they would like to be contacted for participation in Phase 2. Survey respondents were compensated by \$10 gift cards. The study was approved by the university's Institutional Review Board.

**Survey statistical analysis**—For exercise and healthy eating programs, engaged participants were identified as those participating in a program-related activity at least once a month. For all respondents, the response to each psychosocial question was converted to a scale from 1 to 5 based on the Nordic questionnaire's guidelines (Ørhede et al., 2000). The measure score was calculated as the mean of all questions in the measure's category. The Z-

scores for all measures were calculated using Equation 1 and were included in the analysis as the independent variables. Likelihood of future participation was considered as a categorical variable in the scale of 1 (*not likely at all*) to 5 (*highly probable*).

$$Z - score_{respondent} = \frac{\text{measure score}_{respondent} - \text{mean measure score}_{sample}}{\text{standard deviation measure score}_{sample}} \quad (1)$$

Classification and regression tree (CART) analysis was used to cluster independent variables (work psychosocial factors and covariates) and create homogeneous profiles of individuals that have similar participation status in WWPs. CART uncovers complex dependencies among independent variables that may be overlooked in traditional analyses such as linear regression. Because this method does not make distributional assumptions and considers all possible interactions between independent variables, it is a suitable approach for exploratory analysis.

CART follows a repetitive binary splitting process, starting from the root node that includes all the observations (i.e., survey respondents). The algorithm consecutively splits the observations into two sets such that the sum of the squared deviations from the mean is minimized. To ensure the validity of the model, two simultaneous steps were taken. Fivefold cross-validation was used to ensure that the model fit to a data set was able to explain a new data set without overfitting on the training set data. The achieved maximal tree was pruned to remove the branches that added little predictive value. The decision to cut off the branches was based on the complexity parameter (CP), the amount by which splitting that node would decrease the relative error. Statistical analysis was conducted using R software (version 3.3.0) with the package ‘rpart.’

## Phase 2. Focus group and interviews

The second phase consisted of collecting employee feedback to elucidate the direction of potential associations. To recruit participants, a single score was calculated for each survey respondent by averaging the control, support and reversed demand score. The eight employees who reported the highest scores were invited to participate in a focus group, out of which seven participated in the first focus group. Similarly, the 10 employees who reported the lowest scores were invited, out of which five were individually interviewed due to conflicting schedules of these employees.

Focus group and the interview sessions had a semistructured construct. The facilitator first explained the study motives and asked the participants to spend few minutes to remember the working condition when they had filled out the survey. Participants were then motivated to think about favorable and unfavorable aspects of their work by the following question:

- 1 What are the main things you like and dislike about your place of work, including the physical work condition, the people, and your duties on the job?

Next, participants were asked the following:

- 2 Have you participated in WWPs over the last year?

- 3 Can you discuss the main barriers and motivations for your participation/non-participation?

In the following steps, participants were encouraged to talk about links between their participation status and their working condition by answering the following questions:

- 4 Do you think your work has anything to do with your decision to participate/not participate?
- 5 Do you think if you worked at a different place or had a different job, you were more/less likely to participate? Please describe the different workplace.
- 6 Do you think your participation/nonparticipation changed your work performance or how you feel about your workplace? As needed, follow up questions were asked to clarify responses.

The focus group lasted approximately one hour and each interview session took about 20 minutes. The focus group and all interviews were audio recorded and later transcribed. Interviewees were compensated with \$20 gift cards.

**Focus group analysis**—The analysis followed a theoretical thematic approach (Braun & Clarke, 2006). Initially, the first author developed a codebook based on the questions and the study hypothesis, which was further expanded according to the narratives from the participants. The transcripts were indexed by two independent coders using Nvivo software (version 11). Primarily, instances of favorable and unfavorable working condition were extracted and categorized into three main groups. Intercoder reliability for categories was assessed using Cohen's kappa. In the next step, comments were further classified into subcategories. Because agreement for subcategory is conditional on agreement for category, percent agreement was used to assess agreement between coders for sub-category. Coders also decided on existence and direction of an association between each comment and respondents' current and future participation status in WWPs based on their response to the follow-up questions.

## Results

### Survey

Overall 355 employees responded to the survey (response rate = 5.9%). Data from 12 respondents were excluded from the analysis due to excessive missing information. There were no age, gender, or participation status-related differences between the final sample and those excluded. The respondents' demographics and participation status are reported in Table 1. The overall psychosocial conditions, in terms of the main variables, are summarized in Table 2.

Following each branch of the tree from the pool of total observations to a terminal node, variables used in forming each participation profile are identified. The primary variable that distinguished participants from non-participants and engaged participants was work control (see Figure 2). As such, a work control Z-score <0.44 (low), as observed for 46% of the overall sample, was associated with nonparticipation (Node 1). Among the remaining 54%

of the sample that had high work control, support from superior was the next discriminating factor. A support from superior Z-score of  $> -0.018$  (high) was associated with engaged participation in 6% of the sample (Node 2) whereas among those with a Z-score  $< -0.018$ , meaning a relatively low support from superior, total job demands further categorized respondents. Three cut-offs emerged for total job demands. As such, a job demand Z-score  $> 1.2$  (very high) was associated with participation (Node 3). Respondents with  $0.061 < \text{job demands Z-score} < 1.2$  (high) had 70% chance of being nonparticipants (Node 4). Similarly those with job demands Z-score  $< -0.087$  (very low) had 77% chance of being nonparticipants (Node 5) whereas those with  $-0.87 < \text{Z-score} < 0.061$  (low) had 62% chance of reporting participation in WWPs (Node 6). Using the resultant Z-score cut-offs to identify low and high levels of the tree significant variables, the six terminal nodes are summarized in Table 3. Overall error rate for the final pruned tree, that is the proportion of misclassified observations, was 28%. The misclassification rate was 24.5%, 19%, and 30% for nonparticipant, participants and engaged participants respectively.

With regard to likelihood of future participation, 20% of respondents stated that they are highly likely to participate in WWPs, whereas a similar percentage (17%) indicated that their future participation is not likely at all. Age was a significant factor affecting the likelihood of future WWPs participation (see Figure 3). For respondents  $> \text{age } 50$  years, predictability of occupational activities within the next month and control at work were the main distinguishing factors. As such, a predictability Z-score lower than  $-0.25$  (low), as reported by 11% of the sample, was associated with not being likely to participate in the future (Node 1). Among those reporting higher predictability, a total work control Z-score  $> -1.5$  (high) showed a compensatory effect, resulting in an associated highly probable participation for this group (Node 3). As for respondents in other age groups, support from superior and control further categorized respondents into subgroups. A superior support Z-score  $< -0.14$  (low) was associated with likelihood score of 2 (Node 4). Among the remaining sample, total work control Z-score  $> -0.35$  (LOW) further enhanced participation likelihood (node 5). The six terminal nodes are summarized in Table 4. The overall rate was 46%, with 36% misclassification rate for likelihood score of 1 (*not likely at all*), 45% for scores 2–4 (*somewhat likely*), and 51% for score of 5 (*highly probable*).

### Focus group and interviews

Overall, there were six (four females, two males) non-participants, five (three females, two males) participants and one (female) engaged WWP participant among interview and focus group subjects. They were all nonfaculty white-collar employees with a median age of 43 (32–67).

The three main categories of responses related to favorable and unfavorable work characteristics were (Table 5) the content and construct of the job (content), the social aspects of the job (social), the physical work environment (environment). The content category contained 31 comments, the social category had 17, and the environment had 4. A kappa statistic of 0.94 indicated excellent coder agreement for classification by thematic category. The categories were further divided into 15 subcategories. Table 5 summarizes the

subcategories together with exemplary quotes from participants' narratives. The percent of rater agreement was 78%, 88%, and 100% for each category respectively.

Participants stated that the flexibility to adjust their work hours allowed them to prioritize their health by participating in WWP, while still fulfilling their work duties. Experiencing high time pressure and inflexible working hours were negatively associated with participation. When asked if the time pressure during the work shift also affected their after-work decision to participate, participants mentioned that they felt "that would just extend [their] workday." In follow-up, the majority of participants agreed that if WWP were offered off-site and for extended hours, they would have been more likely to participate after work hours.

General job stress was identified as having a bidirectional relationship with participation in WWP. All the participants who listed job stress as an unfavorable job characteristic agreed that the stress led them to take advantage of WWP as a source of relief. They also agreed that availability of WWP and participating in them has contributed to lowering their stress. For instance, participants stated that "it was stress that drove [them] to do those kinds of things," and they also confirmed that "[they] got so much out of it as far as relieving stress that [they] really live for it."

Under the social category, positive and strong peer relations at the office level was positively linked to participation in WWP. A majority supported that membership in thriving teams has encouraged them to try and participate in WWP. Similarly, having supportive supervisors was associated with participation. A clear distinction that participants made was between support from high-level managers and direct supervisors. Comments indicated that though at the organization level, participation is encouraged, their direct supervisors' attitude toward participation is more likely to affect their decision, particularly while using flexi time for participation or participation during break time. Participants stated that despite the high-level organizational communications about the importance of participation, it is only "when the supervisor sets a general tone by saying that everybody can do this, this is something we value and feel important," that they feel comfortable using their break time and flexible working benefits to participate. It is noted that there was a 100% overlap between participants that commented on flexible working hours and supervisor support in conjunction with participation, suggesting the interconnected role of these two work attributes.

There was a limited number of comments categorized under environment. They mainly pertained to the setup of the systems and workstations and participants did not support any association between subcategories in this group and WWP participation status.

## Discussion

In this study, we investigated the association between a broad survey of work psychosocial factors and participation in WWP as a positive health behavior. The main factors that were able to discriminate employees based on their current WWP participation status were control at work, superior support, and total job demand. Although the overall job condition of the

sample was acceptable with the mean score of all psychosocial variables exceeding 3 on a range of 1 to 5 (see Table 2), control at work was identified to have the highest level of importance. Work control represents the extent to which employees have freedom of will in choosing the method, pace, and quantity of the work assigned to them. Narratives from employees confirmed the role of work control by stating flexible working hours as a primary motivator for participation. The impact of work control on leisure time activities, particularly on health behavior has been previously established. A survey of 2019 middle-age U.S. employees identified work control as an important occupational determinant of physical activity outside work, such that employees reporting the highest work control had significantly higher odds (1.55 – 2.01) of meeting the physical activity recommendations (Choi et al., 2010). Similarly Lallukka et al. (2004) reported high work control among women to be associated with healthy diet.

The next important psychosocial factor identified was superior support. Superior support reflects employees' satisfaction from the interpersonal relation with supervisors and its critical effect on participation in WWP was affirmed by the qualitative analysis. Employees highlighted not only the role of a supportive supervisor on their willingness to participate in WWPs, but also the importance of all employees benefiting from it to hinder perception of favoritism at the office. Similar to this finding, Jørgensen et al. (2016) reported low social support to be significantly associated with lower participation in exercise facilities provided through employment. A randomized controlled trial identified training of supervisors regarding their role on their subordinates' mental health as well as the importance of consultation with their employees, to be an effective method to increase employees' perception of supervisor support (Kawakami, Kobayashi, Takao & Tsutsumi, 2005).

Social support has been found to enhance individuals' health in various ways including increased chance of adopting positive health behavior (Uchino, 2006). The qualitative analysis also showed social support, from the peers and supervisors, to have a crucial role in WWPs participation. Similarly, Tamers et al. (2011) showed higher physical activity score as well as fruit and vegetable consumption among employees perceiving higher social support while enrolled in WWPs. These findings suggest leveraging social ties as a means to market health interventions at work (Sangachin, Samadi, & Cavuoto, 2014).

Total job demand, which reflects the perceived level of the job's physical and mental demands and captures different aspects such as time pressure and job monotony was the third important psychosocial variable. The narratives suggested that the high stress resulting from very high working demands motivated employees to seek relief through participating in WWPs. Moreover, high levels of work control allowed them to manage occupational- and wellness-related activities. Consistent with the strain and active behavior hypotheses of the Karasek's demand/control model, we observed one profile of WWP participants falling into "active job" quadrant with the highest demand and control over the job. In contrast, those with the lowest job demand were associated with a non-participation profile. Another participation profile was associated with "low strain" quadrant with the low demand and high control over the job. In a meta-analysis of studies including more than 118,000 adult employees, Heikkilä et al. (2013) observed similar positive associations between low job strain at base line and adoption of healthy lifestyle such as maintaining a normal weight, not

smoking, moderate alcohol consumption, and being physically active at the follow-up. Among diverse interventions aimed to balance job demand and control, restructuring occupational tasks seems to have the most positive impact. Such interventions increase the skills utilized by employees through increasing the variety of tasks required in the jobs and encouraging employees to be involved in decision making (Bambra, Egan, Thomas, Petticrew, & Whitehead, 2007).

Predictability of occupational activities over the following months was identified as a significant factor affecting likelihood of future participation in WWP. This variable encompassed diverse aspects of employees' awareness about the type of tasks, coworkers, supervisors, and organizational changes to be expected within the following month. Job predictability also reflects an aspect of job security. Prior evidence suggests that low job predictability is associated with greater risk of outcomes such as mental distress (Lau & Knardahl, 2008; Stetz, Castro, & Bliese, 2007) and myocardial infarction (Väänänen et al., 2009). The significance of this variable only among respondents with age >50 years could be partially due to the mediating effect of personal attributes such as self-efficacy on the relation between job predictability and health behavior. *Self-efficacy* refers to appraisal of coping with problems and challenges and belief in one's ability to learn new skills, while remaining productive (Fletcher, Hansson, & Bailey, 1992). In the current sample, the majority of respondents held white-collar positions. Their work involved using computers and office technologies, and this may have contributed to job predictability being a significant factor among middle-age employees (the oldest age group in the sample).

This study not only highlighted the psychosocial factors that have a significant association with WWP participation, but also provided insights on their relative importance by using a CART analysis. As such, for effective WWP promotion efforts, addressing issues related to control at work and supervisor support has higher priority than redesigning the job to resolve demand issues. Although in the survey we did not distinguish between WWP utilization during and after work hours, the survey results and the narratives from employees suggested that benefiting from flexible working hours adds an element of control and enables employees to set their schedules based on occupational and personal needs. Similarly, in a qualitative study of assessing barriers to physical activity, university blue-collar employees stated they could become more physically active if the university provided more resources such as flexible working hours (Das, Sartore-Baldwin, & Mahar, 2016). The significant role of flexible working hours on WWP participation also highlights the importance of a holistic approach to employee benefits. Further research is warranted to investigate the interactive roles of distinct employee benefits on employees' utilization of these benefits.

There are some limitations to the current study that should be acknowledged. First, the cross-sectional design of this study did not allow for establishing a causal relation between the significant psychosocial factors and participation status. Although the qualitative analysis aimed at clarifying the direction of observed associations using employees' feedback, future research using a more rigorous design is needed. Second, the generalizability of the results to other settings may have been limited by utilizing an educational institute as the study setting. Despite our effort to recruit participants from all professional groups across the campus, the blue-collar employees were not fully represented

in the sample. The high education level of the respondents, with the majority (58%) having some postgraduate education, limits the generalizability of these findings to populations with lower education levels. The limited sample size and the convenience sampling method used in this study may further limit the generalizability of the results. Furthermore, personal variables such as employees' partners' status, tenure at job, and prior or concurrent participation in multiple programs were not accounted for in this study.

Nonetheless, to the best of our knowledge, this study is the first to assess concurrent association of multiple psychosocial stressors on WWP participation and engagement. Results will inform future research and provide insights on ways to leverage observed associations in order to increase employee participation and engagement in WWPs by considering the effects of the psychosocial factors at work. It will also provide evidence for the need to adopt a holistic approach to employee well-being as suggested by the National Institute of Occupational Safety and Health (NIOSH) Total Worker Health (TWH) initiative. TWH suggests an integrated framework to align health protection and health promotion activities at work (Sorensen et al., 2013). In this context, ensuring a positive psychosocial work environment is in the realm of health protection, while offering and promoting participation in a WWP is the health promotion piece. Our results suggest that the former may affect participation in the latter. Hence, an integrative framework is required to ensure effectiveness of organizational policies to enhance employee well-being.

## Conclusion

Our findings suggest that successful implementation of WWPs requires ensuring that occupational barriers of participation are properly addressed. Active and low-strain jobs and jobs offering high control and supervisor support are more likely to encourage WWP participation. Also despite the necessity of organizational support for wellness activities by offering flexible working hours, the role of immediate supervisors' support on employees' participation decision is indispensable.

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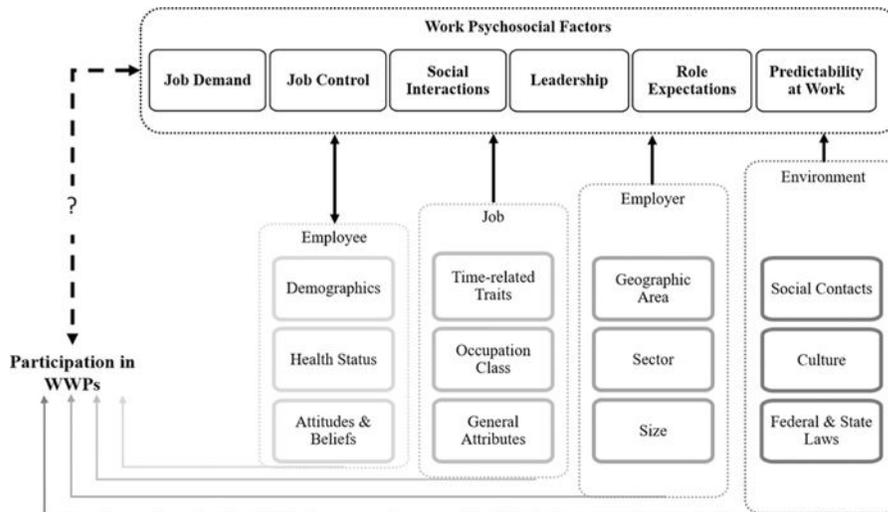
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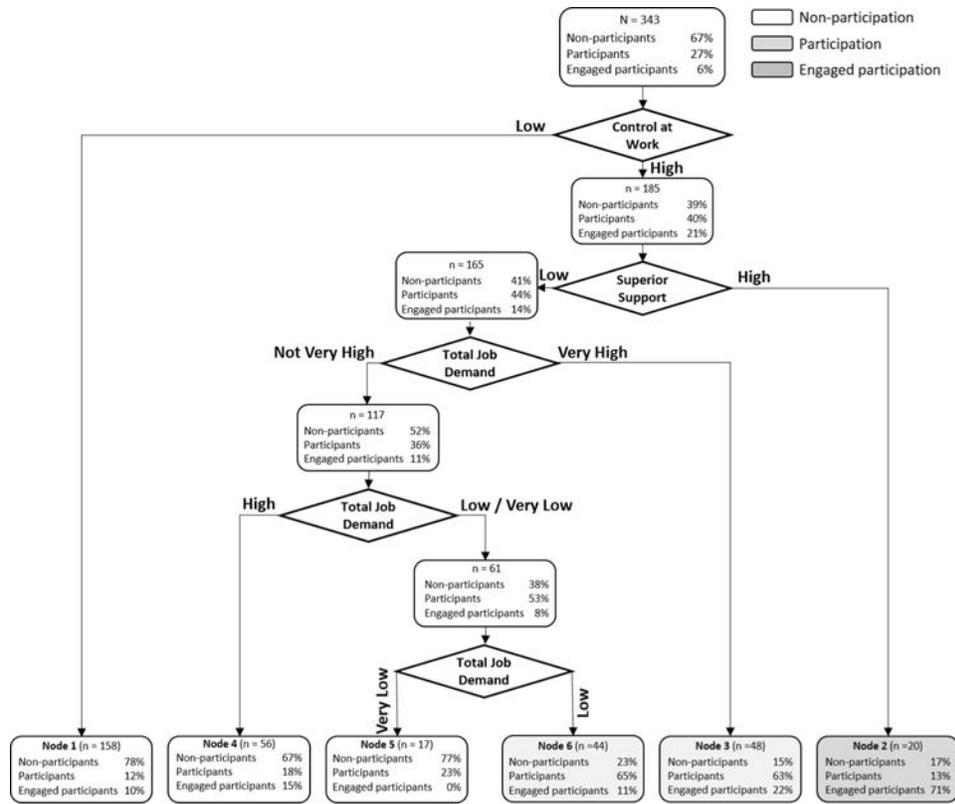
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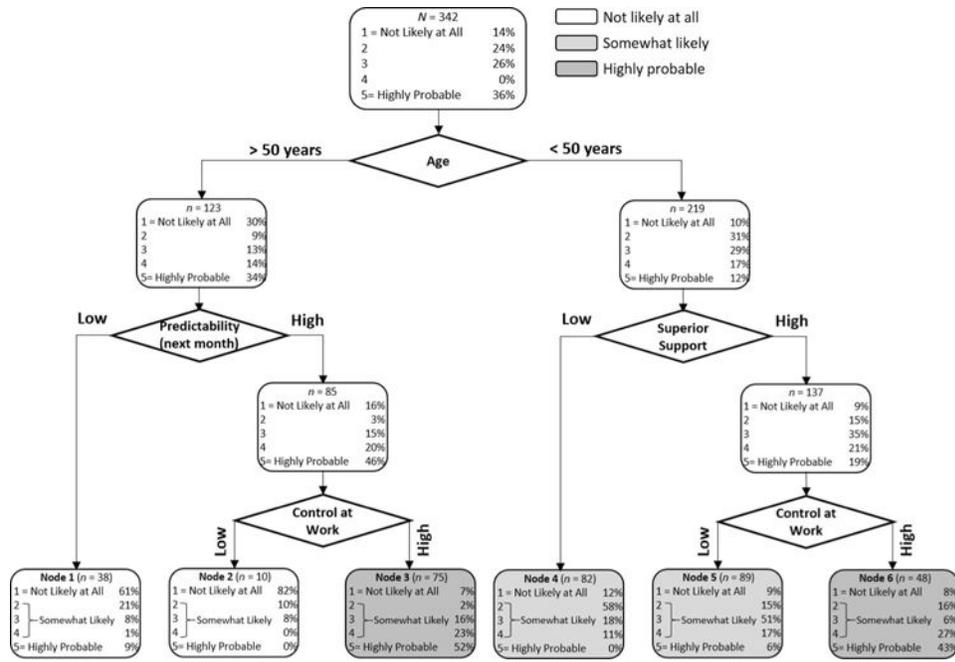
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**Figure 1.** The conceptual model of work system components and the previously identified impacts on participation in worksite wellness programs (WWPs).



**Figure 2.** The classification tree with the psychosocial variables and covariates as input and predicted participation status as output. Among the six resultant profiles, three were associated with nonparticipation, two with participation, and one with engaged participation.



**Figure 3.** The classification tree with the psychosocial variables and covariates as input and predicted likelihood of future participation as output. Response from one respondent was excluded from this analysis due to missing data.

**Table 1**

Breakdown of demographics with regard to worksite wellness programs participation among the sample as well as the university workforce.

Category	Nonparticipants ( <i>n</i> = 194)	Participants ( <i>n</i> = 95)	Engaged participants ( <i>n</i> = 54)	Overall university
Age				
30	10.3%	17.9%	13%	6.4%
30 – 40	24.7%	34.8%	27.8%	20%
41 – 50	25.8%	22.1%	18.5%	24.4%
>50	39.2%	25.3%	40.7%	49.2%
Average ( <i>SD</i> )	46.1 (12.5)	44.7 (12.9)	44.2 (11.1)	49.3 (12.3)
Gender				
Male	32.5%	20%	24.1%	49.5%
Female	67.5%	80%	75.9%	50.5%
Ethnicity				
Other	0.5%	0%	0%	12.2%
White	91.2%	85.2%	91.7%	71.8%
African American	1.5%	1.1%	0%	5.2%
Hispanic	1.5%	1.1%	0%	1.3%
Asian	5.2%	12.6%	7.4%	6.3%
Education level				
High school diploma	14.4%	10.5%	1.9%	18.3%
Associate's degree	9.8%	5.3%	11.1%	5.3%
Bachelor's degree	21.1%	21.1%	22.2%	17.6%
Master's degree	27.8%	44.2%	38.9%	17.9%
Doctorate	26.8%	18.9%	25.9%	28.4%
Body Mass Index (kg/m <sup>2</sup> )				
25	51.5%	49.5%	57.4%	—
25.1 – 30	24.2%	29.5%	25.9%	—
30.1 – 35	11.9%	12.6%	11.1%	—
35.1 – 40	7.2%	4.2%	1.9%	—
>40	6.7%	4.2%	3.7%	—
Average ( <i>SD</i> )	26.8 (7.3)	26.6 (6.7)	25.6 (6.1)	

*Note.* Due to use of the listserv distribution (convenience sampling), the final sample was not representative of the university population.

**Table 2**

Descriptive statistics of the six psychosocial measures included in the analysis. Values can range from 1 (*low*) to 5 (*high*).

Psychosocial measure	Mean (SD)
Job demand	3.13 (0.58)
Work control	3.23 (0.78)
Social interactions	3.75 (0.81)
Leadership	3.44 (1.06)
Role expectations	3.96 (0.84)
Predictability at work	3.54 (0.80)

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**Table 3**

Six profiles emerged from the classification and regression tree analysis with regard to current participation status.

Node no.	Control at work	Superior support	Total job demand	Predicted participation status
1	Low	—	—	Nonparticipant (46.2%)
2	High	High	—	Engaged participant (5.8%)
3	High	Low	Very high	Participant (14%)
4	High	Low	High	Nonparticipant (16.3%)
5	High	Low	Very low	Nonparticipant (4.9%)
6	High	Low	Low	Participant (12.8%)

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Six profiles emerged from the classification and regression tree analysis with regard to likelihood of future participation.

**Table 4**

Node No.	Age	Predictability (next month)	Control at work	Superior support	Predicted likelihood of future participation
1	>50 years	Low	—	—	1 ( <i>not likely at all</i> , 11%)
2	>50 years	High	Low	—	1 ( <i>not likely at all</i> , 3%)
3	>50 years	High	High	—	5 ( <i>highly probable</i> , 22%)
4	<50 years	—	—	Low	2 (24%)
5	<50 years	—	Low	High	3 (26%)
6	<50 years	—	High	High	5 ( <i>highly probable</i> , 14%)

**Table 5**

Focus group and interview narratives, summarized into three main categories.

	Favorable condition	Quotes	Unfavorable condition	Quotes
Content ( <i>n</i> = 31)	+Flexible working hours ( <i>n</i> = 4) <sup>a</sup>	"I set my own schedule every day."	↔General job stress ( <i>n</i> = 7) <sup>a</sup>	"Some days I am so anxious about all the things that could go wrong."
	Skill discretion ( <i>n</i> = 4)	"I get to use my skills in a way that is interesting and challenging."	-High time pressure ( <i>n</i> = 6) <sup>a</sup>	"It's sometimes really critical that you solve [clients'] problems ASAP, I just feel the pressure of it so much."
	High learning opportunities ( <i>n</i> = 3)	"[My job] really fosters a lot of learning."	-Inflexible working hours ( <i>n</i> = 3) <sup>a</sup>	"My boss made it very difficult to access that flex time I was promised."
	Physically active work ( <i>n</i> = 2)	"I can put in 6,000 steps a day on my Fitbit when I have a day out [of the office]."	Resource limitation ( <i>n</i> = 2)	"Because of lack of funding, we need to go out there and do what we do to fulfill our mission."
Social ( <i>n</i> = 17)	+Positive peer relation ( <i>n</i> = 6) <sup>a</sup>	"It's a very collaborative office, both inside and outside [the work]."	-Unsupportive supervisor ( <i>n</i> = 5) <sup>a</sup>	"[We] get no support from our supervisor, it's like we are chained to a desk."
	+Supportive supervisor ( <i>n</i> = 3) <sup>a</sup>	"I have the support of my boss to do [my job], she is very encouraging."	-Favoritism perception ( <i>n</i> = 3) <sup>a</sup>	"I feel uncomfortable when I have to do things under the table because of my boss's hypocrisy."
Environment ( <i>n</i> = 4)	—	—	Excessive sitting ( <i>n</i> = 2)	"I don't like that I do sit a lot."
	—	—	Outdated technology ( <i>n</i> = 1)	"Our computers are so slow."
	—	—	Limited natural light ( <i>n</i> = 1)	"There is no natural light in my office."

Note.

<sup>a</sup>The subcategories that respondents identified as significant motivator/barrier to participation.

+ and - = subcategories with positive and negative associations with worksite wellness programs (WWPs) participation respectively.

↔ = a bi-directional association between the subcategory and WWP participation status.